

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR LETTERS PATENT

INVENTOR:

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TITLE:

Collaborative Content Programming

BACKGROUND OF THE INVENTION

Related Applications

The present application is related to co-pending application entitled “Method, Computer Readable Media and Apparatus for the Selection and Rendering of Audio Files in a Networked Environment,” assigned to the same assignee as the present application, which is incorporated
5 herein by reference.

Field of Invention

The present invention relates generally to the field of media content programming. More
10 specifically, the present invention is related to user initiated collaborative content programming.

Discussion of Prior Art

Broadcasting has traditionally been the preferred approach to content distribution. Ways
of distribution include radio, television and cable, as well as other media such as newspapers and
15 magazines. A characteristic of traditional broadcasting has been that the audience (alternatively
listeners, viewers, readers, etc.) plays a passive role, with only an indirect effect on the actual
content that is delivered. Typically, the owners of a distribution channel select content according
to their interpretation of the collective preferences of their target audience. The selected content
is then distributed to the user with the hope that their needs and preferences are satisfied.

20 Cable TV channels, for instance, are becoming more specialized by strictly creating
programming channels with specific topics or subjects, such as history, classic movies, or nature.
Management of these content delivery enterprises choose a content category based on numerous

factors, typically potential size and profile of the target audience, revenue streams (e.g., advertising, subscription fees), competitive offerings, etc. After analyzing the potential profits of these categories, programming managers are then responsible for selecting the specific content that is broadcasted.

5 Similarly, in the case of music radio stations, many stations adopt a musical style (e.g., country-western, blues, pop), and exclusively play music corresponding to that style. Presently there are numerous web content delivery services emphasizing music delivery to users according to their music styles and tastes. One feature available is a system wherein users select songs and the system then finds a number of other songs that sound similar to those selected. These songs, however, are specified, or found through search engines that find songs by genre or a pre-
10 assigned description (e.g., heavy metal, country, etc.).

Other web content systems allow users to become a disc jockey and design a station tailored to their musical tastes. Members design their streaming music station by rating songs, artists, and albums, and through this, the system determines users' preferences. This process,
15 however, can be an inconvenience to those who just want to listen to music rather than take the time to create a station.

As seen, recent technological developments have made it possible to have a practical means for the audience to communicate back to the distribution channel. However, this capability has not significantly affected the way in which content is selected. Even the adoption
20 of the Internet by consumers and the emerging capability of delivering content have failed to produce significant improvements for selecting content. Examples of prior art systems using user preferences to filter content or variations thereof are described below.

Launch.com's "launchcast", Wired Planet's website listen.com and Microsoft's®
MongoMusic are examples of user selectable music systems. These services may be protected
by various trademarks and copyrights of the named companies.

U.S. Patent Number 5,740,549 discusses an information and advertising distribution
system in which a data server stores and updates a database of information items and
advertisements on a periodic basis. Profile data is obtained for subscribers and includes
information such as viewing preferences and categories for which a subscriber does and does not
want to view.

U.S. Patent Number 5,774,170 describes a system and method for enhancing television
and radio advertising by targeting, delivering, and displaying electronic advertising messages
(commercials) within specified programming in one or more pre-determined households.
Commercials can be delivered to specified homes or displays via over-the-air or wired delivery
systems.

U.S. Patent Number 6,002,393 provides a system and method for targeting TV
advertisements to individual consumers by delivering a plurality of advertisements to a display
site. A display of selected advertisements is suited for the individual consumer. Upon
command, the system may also deliver advertisements to a viewing site.

U.S. Patent Number 6,029,045 presents a system for communicating a programming data
stream that is transmitted to a set-top box in a house of a user and stored in a predetermined
portion of the pieces of local content data based on predetermined criteria. Based on a plurality
of preferences predetermined by the user, the set-top box may also select a particular piece of
local content to be inserted into the data stream.

U.S. Patent Number 6,112,181 describes a matching and classification utility system for performing matching, narrow casting, classifying, or selecting material. The system includes assigning a user to a user class based on information and matching digital information with a user class based on associated rights management.

5 Whatever the precise merits, features and advantages of the above cited references, none of them achieve or fulfill the purposes of the present invention.

SUMMARY OF THE INVENTION

10 A system and method for optimizing use of available media bandwidth assigns users to a “best-fit” scenario based on a combination of individual and aggregate user behavior. The system learns about each user’s individual preferences and builds profiles for users and channels. The content for a given channel is selected either directly by the users or indirectly by software that uses a collaborative content programming method. Collaborative content programming offers an intermediate solution in which users with similar preferences jointly decide what content is
15 included in a specific channel. The system also allows users to define multiple personae that represent different sets of preferences, moods, etc. that a single user may have at different times.

20 In a preferred embodiment, the media is Internet radio; the bandwidth a plurality of music channels and the method of content selection includes votes by many different users selecting songs. The votes are used in a collaborative manner so that the burden on each user to select desired programming content is lessened. A user is responsively shifted to a different station (channel) if the given station no longer fits the user’s profile.

In one embodiment, the present invention predicts the likelihood that new songs will be liked by a station's audience, and does this in an active manner. This embodiment provides the opportunity to estimate user ratings for new content.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a general process of developing a user's preferences and profile with musical choices.

Figure 2 illustrates a general overview of the content selection process.

Figure 3 illustrates a flow chart demonstrating the preferred embodiment for the selection process of receiving content/musical selections of the present invention.

Figure 4 illustrates a detailed embodiment of developing a user's profile in the present invention.

Figure 5 illustrates a system diagram of the present invention.

DETAILED DESCRIPTION

The following method gives a content provider the ability to maximize bandwidth allocation, increase user loyalty, and enable the audience to gain more control over the content they receive via broadcasting networks. This method allows users to express their preferences by voting on the content they receive. These votes are then used to determine what content to deliver at any given point in time. Moreover, users are assigned to the channel(s) that best match their preferences.

While it is technically possible, and in some cases economically viable, to deliver content customized for an individual user, and give this user full control over the programming of this channel, this creates a burden on the user to completely specify what content should be delivered. At another extreme, traditional programming gives the user no control over the actual content other than selecting among multiple channels.

Collaborative content programming is an intermediate solution for a content provider to offer, within a designated bandwidth, channels in which users with similar preferences can jointly decide what content to include in the channel, thus sharing the burden of selecting the desired content. Users collaborate indirectly in the content selection process by letting their individual preferences be known to the system. General collaborative filtering is known in the art; however, the present invention utilizes an active approach to determine content programming for network distribution of materials based on user votes.

This method offers consumers the ability to create virtual communities around a topic many are passionate about, such as music or more generally content. Because the system learns from its users' preferences, and users jointly decide what content to include in the channel, it increases switching cost for consumers and fosters loyalty towards content providers. Further, the method and system of the present invention makes specific content (e.g., songs) recommendations based on a dynamically updated user matching scheme, that is, based on what a particular user does and what other users do (e.g., what content users request and how they vote). Thus, a user needs not select content from a given (and arbitrarily pre-defined) genre to be assigned to a particular station/channel.

In this model, the content for a given channel is selected either directly by the users (by requesting a title) or indirectly by software that considers the aggregate preferences of the users who have signed up for this channel. The system learns about each user's individual preferences and builds profiles for users and channels.

5 For a new user, for whom no preferences are known, the preferred embodiment presents several selections to that individual user (note that this is different from a regular channel, where many users may be participating.) This is solely for the purpose of building a profile, so the system can skip to the next selection as soon as the user casts a vote. The selections are chosen to capture the preferences of the user. For example, the first few selections may be drawn from the lists associated with channels that represent disjoint groups of users (to capture variety and some high-level preferences) whereas later selections can be used to fine-tune the preferences by choosing selections on "different but close" channels. Once again, this is done for each user, in fact for each persona, only once in order to build an initial profile and tentatively map the user to a channel. After users join a channel, they can continue casting votes and their profile will become more accurate with use.

10 Every time a user connects to the system, the list of channels is searched to find the one that best matches the user's profile. If no existing (i.e., active) channel is a good enough match, a new channel may be created if the bandwidth constraints allow it. The user is thus assigned to a channel, to which one or more users may be connected. The method assures that all users connected to a channel have similar preferences.

Users connected to a channel may either explicitly request content; may cast votes for or against content received over the channel; or may be completely passive and just listen to/view the content.

Users request content by selecting from the database of available content. In one embodiment, users may contribute their own content for all users on the same channel to receive. In another embodiment, the content is distributed throughout the network, and is added to each channel on demand.

The collaborative programming model selects content to be delivered to users over each channel. The model takes into consideration the users' profiles, the list of pending user requests (if any) the content database and the history of titles delivered over said channel. The model determines what titles are most likely to be within the aggregate set of preferences of all users actually connected to the channel, and delivers those titles. These may include titles that users on the channel have requested, or titles for which some of the users have expressed their preference. Additionally, the model can estimate, based on an aggregation of profiles, what each user's vote would be for a given title, even if no vote has been cast by the user for or against said title. Thus, the model can introduce new content that will, with high probability, be liked by all users in the channel. By updating title selections quickly and keeping the user interested, the system effectively rewards those listeners who take an active part in the voting process by selecting the content they like.

As previously described, new users are first individually exposed to a plurality of songs to develop an initial user profile and appropriate first guess matching channel. After this initial assignment, users may continue to cast votes. A particular user is responsively shifted to a

different channel if a user no longer fits the collective preferences of the users of that channel.

The listener may be passive, i.e. doesn't have to switch stations directly. The system does the matchmaking based on all assigned listeners, whose behavior may be predicted or actually measured by their votes.

5 Also, the present system preferably adapts to the dynamic nature of the audience. This ability of the system to learn and adapt is best exploited with content for which there is demand for repeat viewing. One example of such content is music, where extremely popular songs are maintained on radio stations' heavy rotation lists. Other examples exist in different areas of entertainment and news, such as children's movies, television programs, reports or articles by a certain author, etc. To dynamically adapt, as a user's profile is continuously updated, the system
10 detects patterns in a user's behavior and learns to adapt, for example, by making selections based on the users actually connected or determining time of day in which each title is most desired. Thus the content provider bandwidth in use at any given time is maximized, while achieving the highest user satisfaction.

15 In the broadest sense, this invention is a system for modeling user preferences given an association with indirectly related knowledge. That is, data mining determines the association so the user doesn't have to perform a self-analysis survey.

A company operating under the present invention model would have the ability to deliver content over multiple channels simultaneously. The number of channels affects the degree to
20 which individual user profiles can be met; for example, with only 10 channels, users would be aggregated in 10 groups, each group possibly having a broad base of preferences. The higher the

number of channels, the best users' demands can be met. However, operating each additional channel represents an increase in cost.

Ultimately, the decision on how many channels to operate will be made based on cost-revenue targets but may be further limited by technical constraints and regulatory issues.

5 Different cost structures apply depending on the broadcast technology adopted. In the case of the Internet, providing additional channels in general requires only a marginal cost.

10 An additional cost of providing this service would be the actual content. Several alternatives exist here, ranging from a centralized database of content to which users are restricted (and for which performance rights have been acquired directly by the service provider) to a collaborative effort on behalf of the consumers, who contribute their own content to be shared with other users (this would most likely require payment of licensing fees for public performance to copyright owners).

15 Revenue models used in traditional broadcasting can be applied to collaborative content programming. Subscription fees paid by the users or advertising revenue are the simplest. Even these two thoroughly tested revenue models have some new characteristics in the context of the present invention. Consumers' value is higher than in normal broadcasting since users have access to a highly customized channel. Similarly, advertisers may be able to make decisions based on users' interests and may also get feedback through the system's votes.

20 Depending on the underlying technology, the system is able to support other revenue models such as short-term subscriptions (for days or hours), pay-per-vote, pay-per-title, etc. With interactive delivery mechanisms such as the Internet, other sources of revenue are available as

well. As part of the voting mechanism, users may select a “buy” option. When this applies to actual content, this will trigger a transaction to purchase the content for private viewing.

In the case of music delivery, for example, record labels may introduce new artists or titles in the collaborative content programming channels that best match the characteristics of new content; users can then indicate their preferences and also purchase and download the title. For tangible products such as portable music players, a targeted advertisement may generate transactions that may be completed online.

PREFERRED EMBODIMENT

While this invention is illustrated and described in a preferred embodiment, the device may be produced in many different configurations, forms and materials. There is depicted in the drawings, and will herein be described in detail, a preferred embodiment of the invention, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and the associated functional specifications for its construction and is not intended to limit the invention to the embodiment illustrated. Those skilled in the art will envision many other possible variations within the scope of the present invention.

In this preferred embodiment, the media is Internet radio, the bandwidth is composed of a plurality of streaming audio channels and the method of content selection includes votes by many different users. The votes are used in a collaborative manner so that the burden on each user to select desired content is lessened. A user is responsively shifted to a different station (channel) if the given station no longer fits the user’s profile.

Figure 1 illustrates the general process of determining a user's preferences and developing an initial profile with musical choices. A song is selected **100** from the server and streamed to the user for listening **102**. The user can cast a positive, indifferent or negative vote **104**, and this vote is noted and added to the user's profile **106**. The process continues and repeats itself every time musical content is sent to the user until enough information is gathered about the user for an initial channel assignment (**108** and **110**).

An overview of the channel matching process is shown in Figure 2. This process assigns a specific channel to a user based on his or her profile, but also on the profiles of other users. When a new user connects, she must identify herself to the system **200** (e.g., userid/password, cookies, etc.) The system then retrieves the user's profile **202** and compares it to the profiles of all other currently connected users **204**. This comparison is based on computing a "distance" between two user profiles: the smaller this distance, the closer the preferences of the corresponding users. Thus, by finding the channel in which this difference is minimal, the system selects the best match. If the distance between the profile of the connecting user and the closest channel exceeds a threshold **206**, then a new channel is created **210**, and the connecting user assigned to it **214**. This threshold is adaptive and its value is increased **212** as the available bandwidth is used up, until no more new channels can be created, at which point connecting users will be matched to one of the active channels. If the distance from the user to the closest channel is below said threshold, the connecting user is assigned to an existing channel **208**.

Figure 3 illustrates the content selection process for the songs delivered by a specific channel. First, the system identifies all users connected to the channel **300** and retrieves their corresponding profiles **302**. These profiles contain votes for or against songs that have been

played in the past and are therefore in the song database. In some cases, the system may have explicit votes about this song from all users in the channel, and therefore can compute what percentage of these users like this song. In other cases, only some users will have cast a vote about this song; the system can then estimate the response of the other users on the channel based on these limited votes. In either case, the system selects a song **304** that, with high probability, will be liked by most users in the channel. Next the system checks the channel history **306** to guarantee that songs are not repeated more often than a certain (programmable) number of times per period of time (for example, once a day.) If the selected song does not match this criterion, a new one is selected and the process continues until a song is considered acceptable. This song is then streamed **308** to all users of the channel, who may choose to provide additional feedback to the system by casting new votes **310**.

Users who are connected to a channel may request specific songs, as illustrated in Figure 4. A user who is listening to a given channel may select a song **400** from the song database to indicate to the system his preference for this song. The system may also allow adding new content not previously included in the song database **402**, in which case the song is added to said database **404**. A user request is considered an implicit vote for this song, and this vote is added to the user's profile **406**. This song request will be taken into consideration in step **304** when songs are selected by the system for streaming to users. Different criteria for merging user-initiated and system-initiated song selections are possible, the simplest one being to give higher priority to user requests. In this case, adopted in this preferred embodiment, whenever a user makes a request, this song is played on the corresponding channel before any other automatically selected songs are played. User requests have the effect of broadening the list of possible songs that the

channel can play, thus adapting to the changing preferences of users and to the introduction of new content. The system can estimate, with a degree of certainty, what the reaction of other users will be to songs they have not yet evaluated, and indeed may not have heard yet.

Figure 5 illustrates the system **500** of the present invention. Content **502** represents
5 computer storage of specified content such as songs, news, etc. This content is stored in a database and in some embodiments is distributed over multiple databases (e.g., songs located on various web servers distributed across the web). Content engine **504** drives the model of the present invention and includes computer processing, software (e.g., data mining algorithms),
10 feedback inputs, time of day input, etc. Content engine **504** collects similar content located in **502** into channels 1-n (e.g., streaming audio channels). These channels are available to a multiplicity of users (1-z) **506–509** (those requesting access to the content) in distributor **510**. Content channels are first selected for a requesting user, for example user 1 **506**, based on the history of specified content title requests and evaluations, which together represent a profile of preferences). A best match algorithm in the content engine **504** chooses, in this example,
15 channel 1 to broadcast to the requestor **506**. Other requestors are also connected to channels best matching their requests. Users then register votes for or against specific instances of content (including new content **514**) within the channel they are connected to. This feedback is collected from multiple users connected to the same channel; in this case user 1 **506** and user 3 **508**, and is used to determine future content of the specified channel. In addition, the feedback is used to
20 redirect the requestor to a new channel when the feedback indicates a new best match. Time of day **512** is also used, in alternative embodiments, to alter content or channel connections, based on user/group behavior as previously described above.

Although musical content from web distribution centers has been used as the preferred example, the system may also be used with cable or satellite channels with a low-bandwidth user feedback channel (e.g., a modem periodically sends user votes and preference data back to the distribution center). The system may also be used for video, software, personal ads, news stories, restaurant rating, evaluating advertisements, and political propositions including matching candidates and issues.

CONCLUSION

A system and method has been shown in the above embodiments for the effective implementation of collaborative content programming. While various preferred embodiments have been shown and described, it will be understood that there is no intent to limit the invention by such disclosure, but rather, it is intended to cover all modifications and alternate constructions falling within the spirit and scope of the invention, as defined in the appended claims.

The above enhancements and described functional elements are implemented in various computing environments. For example, the present invention may be implemented on a conventional IBM PC or equivalent, multi-nodal system (e.g., LAN) or networking system (e.g., Internet, WWW, wireless web). All programming and data related thereto are stored in computer memory, static or dynamic, and may be retrieved by the user in any of: conventional computer storage, display (i.e., CRT) and/or hardcopy (i.e., printed) formats. The programming of the present invention may be implemented by one of skill in the arts of database or network programming.